DEVELOPING A COMPREHENSIVE

FIRE SAFETY PROGRAM FOR OLDER ADULTS

EXECUTIVE DEVELOPMENT

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ABSTRACT

The problem identified for this applied research project was that the Boston Fire Department does not have a comprehensive fire safety program that meets the specific needs of its older adult population. It was the purpose of this project to identify these needs and make recommendations for the creation of an older adult fire safety program that would suit the needs of Boston's older adult population. A descriptive research method was used for gathering information and statistics on this matter.

This research focused on answering five questions:

- What are the demographics of the older adult population in the City of Boston, Massachusetts and what are the future projections?
- How is the older adult population affected by fire?
- What are the issues that must be addressed when creating an educational program for the older adult population?
- What simple changes in fire safety technology would have a positive affect regarding the older adult population?
- What are the attributes of existing programs now being implemented by other fire safety educators?

The literature review studied the needs of older adults regarding education and the affects of aging on the capability to learn. Improvements in fire safety technology regarding smoking, cooking, and fabrics used for the production of clothing were researched. Research included the technology of current smoke alarms and possible improvements of these devices to better serve the older adult population. This was done by studying literature from the National Fire

Academy, the University of Massachusetts, and from the National Fire Protection Association. Personal and written communication was made between the author and the Boston Visiting Nurses Association as well as engineers involved with the design of fire safety products.

Results show that as of 1990 the population of people over 60 in the City of Boston totaled 15.1%, and that nationally the older adult population could reach 70 million by the year 2030. Fire services in Boston as well as across the country should plan now to meet the fire safety needs of our country's aging population.

Further results shows that as we grow older there are changes in the way we learn. This occurs because of our past experiences and changes in our physical capabilities. Fire safety educators must design programs that account for these changes.

Recommendations were made to assist the Boston Fire Department in the development of an older adult fire safety program. Recommendations include establishing a committee to study existing programs in use nationally and establish a program that meets the specific needs of the City of Boston. Other recommendations include changing organizational culture to be more responsive to the needs of fire prevention, providing more funds for older adult fire safety education, establishing liaisons with other agencies that interact with the older adult population, and the active participation in the study and implementation of fire safety technology for older adults.

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INTRODUCTION

The problem identified for this applied research project was that the Boston Fire Department does not have a comprehensive fire safety program that meets the specific needs of its older adult population. The Federal Emergency Management Agency (FEMA) manual *Strategies for Marketing Your Fire Department Today and Beyond* states that current fire service philosophy is presently moving leaders in this profession to be more active in community affairs. To this end it is encumbered upon fire chiefs to be responsive to present and future community needs. The American Association of Retired Persons (AARP) states that the older adult population or senior citizens as they are often called will reach 70 million by the year 2030 (AARP, 1997). The medical profession and the police service profession are focusing on "prevention" more so than ever before, with positive results. The fire service profession should incorporate this same philosophy. This action can achieve two goals; a reduction in injury and death due to fire, and the development of a positive relationship between the fire department and the community it serves. The latter benefit can help fire departments in time of financial cutbacks and political pressures (FEMA, 1998).

Boston Fire Commissioner Martin E. Pierce Jr. is currently expanding and improving the Boston Fire Department's fire education services to the citizens of Boston. The purpose of this applied research project was to investigate the fire safety needs of the older adult population in Boston with the intent of incorporating the findings into an older adult fire education program.

The methodology included a literature review of past writings and research by educators, engineers, and persons presently undertaking the task of fire safety education. Literary sources were obtained from the National Fire Academy's (NFA) Learning Resource Center (LRC), the University of Massachusetts' Healy Library, Boston, Massachusetts, the National Fire

Prevention Association (NFPA) in Quincy, Massachusetts, personal interviews, and written questionnaires. Descriptive research was used to answer the following questions:

- What are the demographics of the older adult population in the City of Boston, Massachusetts and what are the future projections?
- How is the older adult population affected by fire?
- What are the issues that must be addressed when creating an educational program for the older adult population?
- What simple changes in fire safety technology would have a positive affect regarding the older adult population?
- What are the attributes of existing programs now being implemented by other fire safety educators?

BACKGROUND AND SIGNIFICANCE

Background

Protecting all citizens from fire is the most important mission of all Fire Departments across the country. Identifying our local population and seeking out the most vulnerable is mandatory for any good fire prevention and fire education program.

According to the FEMA, the elderly and the very young are most at risk to die or become injured from fire. " In 1995, the elderly --- people over 70--- have one-and-one-half to four times the national average fire death rate, depending on how old they are, with the risk increasing sharply for people over 80" (FEMA, 1998, p. 6).

The AARP states that people 65 years of age and older numbered 33.9 million in 1996. They represented 12.8% of the population. This was an increase of 2.6 million or 8% from 1990.

Since 1900 the population of Americans 65 years of age and older has more than tripled, going from 4.1% in 1900 to 12.8% in 1996. People are also living longer than ever before. The 1996 figures for people age 65-74 was eight times larger than the figures for 1900. The 75-84 age group was 16 times larger than 1900, and the 85+ age group was 31 times larger than 1900. Figures compiled in 1996 also stated that people now reaching the age of 65 had an additional life expectancy of another 17.7 years, and that a child born in 1996 could expect to live 76.1 years or about 29 years longer than a child born in 1900.

Future growth of the older adult population will continue but has slowed during the 1990's because of the "Great Depression" of the 1930's in which fewer babies were born. The major increase will be between 2010 and 2030 when the "baby boomers" reach age 65.

In 1996 Massachusetts had 859,000 residents over the age of 65, which equaled a 5.4% increase from 1990. Of these 859,000 older adults, 9.54 were living with incomes below the poverty level (AARP, 1997).

The City of Boston, Massachusetts had its last census completed in 1990. Boston's current population figures can be assumed to be much larger considering information learned in the AARP study. The total population for people in Boston age 60 and over was 86,925 or 15.1%; 78.7% identified themselves as Caucasian, 14.3% were identified as Black, 3.6% as Hispanic, 3.2% as Asian, and 0.18% as other races (U.S. Census Bureau, 1993). A report titled *The Health of Boston 1998* states that there were 65,152 residents in Boston over the age of 65. This figure accounted for 11.3% of the city's population. Females accounted for 63.6% of people over 65 in the City of Boston. People over 85 years old accounted for 1.4% of the city's population. This sector of the population had the most health problems, as they accounted for 29.5% of all hospital discharges during the period 1994 –1996. This hospitalization rate was

8.1% higher than that of the state of Massachusetts. The two leading causes of hospitalization between 1990 and 1996 were heart disease and shock (Boston Public Health Commission, 1998).

Boston census figures show an increase in Boston residents age 65 and over living below the poverty level. Poverty figures for this age group rose from 12.9% in 1980 to 15.3% in 1990. These figures were higher than the state figures, which were 9.7% in 1980 and 9.4% in 1990 (U.S. Census Bureau, 1993).

According to 1990 figures most of Boston's older adults lived in West Roxbury, Roslindale, South Boston, the Fenway, the North End, and the South End sections of Boston. The sections of Boston with the smallest number of older adults were Allston, Brighton, Roxbury, Jamaica Plain, North Dorchester, South Dorchester, and Mattapan (Boston Public Health Commission, 1998).

The National Fire Protection Association states that fire has had devastating effects on the older adult population. People over 65 have higher home fire death rates than every age group except children under five. People over 65 accounted for 25% of civilian fire deaths between 1989 and 1993, or 963 deaths per year. The fire death rate for people over 85 years of age was nearly four times the national death rate (NFPA, 1996).

Significance

This applied research project was important to the National Fire Academy's (NFA) "Executive Development" course because information learned from this course can be applied to all aspects of the fire service, including prevention, education, mitigation and response. Executive Development theory encouraged students to think "outside of the box" and to foresee and manage changes in our profession. Interacting with the community especially in the form of fire prevention and education is more commonplace in other countries. Countries outside of the

United States invest up to five percent of their budget on fire prevention. Of the 18,000 firefighters on the Tokyo, Japan Fire Department, 1,850 are dedicated to full time fire prevention (FEMA, 1997).

It is important for executive fire officers to know the demographics of their cities and towns. From this information plans can be developed to provide preparation and education to the community. This information also allows a chief fire officer to interact with community leaders who can identify the community's most vulnerable population so that the fire chief can develop plans for education and response to the neediest of the community. Fire chiefs should realize that response is only one piece of the puzzle, preparation by identifying the different needs of the population, and providing education is paramount (personal communication, Deputy Chief John Hasson, Emergency Management Director, Boston).

This project focused on fire education and safety for the older adult community. As stated before the population of older adults is growing faster than any other segment of the population, and could number 70 million nationally by 2030 (AARP, 1997). Addressing the needs of the older adult population is now and will continue to be one of the most formidable tasks facing fire executive.

LITERATURE REVIEW

Older Adults and Fire

Research started with gathering information regarding the older adult fire problem. A report written by John R. Hall for the National Fire Protection Association titled, *Patterns of Fire Casualties in Home Fires by Age and Sex, 1991-95* produced the following results regarding older adults:

- People age 65 and over had a fire death rate of 27.6 fire deaths per million population, or roughly twice the national average.
- People age 75 and over had a fire death rate of 37.9 fire deaths per million population, or nearly three times the national average.
- People age 85 and over had a rate of 59.4 fire deaths per million or more than four times the national average (Hall, 1998, January, p. 4).

Older adults had higher percentages of deaths caused by burns, which indicates that they were closer to the point of ignition then other age groups. Hall substantiates this further by stating that one-half of the older adult fire victims were found in the same room as the origin of the fire. Ignition of clothing is more profound within the older adult population, this report stated that 6.9 percent of smoking related fire involved the clothing of older adults as opposed to only 2.0 percent for people under 65. The role of clothing ignition was also more prominent among older adults in fires involving heating equipment, and cooking equipment. Older adult males were also more likely than females, to die or become injured by fire. Older adults that sustained injuries from fire were much more likely to be physically or mentally challenged (Hall, 1998, January).

Adult Learners

The literature review included research on adult learning or distinguishing the differences between the way people learn as adults as opposed to the way they learned as children. Two general methods were discovered; pedagogy which is defined as the art and science of teaching children, and andragogy, the art and science of teaching adults (Ingalls, 1999).

Ingalls' theory describes the adult learner as being different from the child learner. Ingalls states that adults need teaching methods that will "…generate meaning and knowledge

from our life situation in a way that we can utilize all of our activities as potential for learning" (Ingalls, 1999, p.3). Ingalls describes a child, as having very little experience to draw from so much of what a child learns has to be banked for later use.

Andragogy contains four elements. The first of which is "self-concept". Self-concept describes adults as having a need for others to see them as capable. Adults want to be thought of as being mature, and resent any situation that violates this perception of independence. Therefore, adults require self-direction and require a relationship with their instructor that is a partnership rather than one of a director (Ingalls, 1999).

The second basic concept of andragogy is "experience". Ingalls explains experience as:

> Adults, in the course of living have accumulated vast quantities of experience. It is safe to say that we are our experience. Our experience is what we have done; i.e. the sum total of our life's impressions and our interaction with other persons and the world (Ingalls, 1999, p. 6).

Learning for adults must include techniques that draw from these experiences. "Older adults have lots of experience and want to share that experience" (Gamache, 1997, p.2-45). One-way communication techniques such as lectures may work well for some audiences, but instructors of older adults should tap into their experiences by using multi-directional techniques. Techniques should include group discussion, role-playing, simulation, and skill practice. Adult participants should function as teachers and learners (Ingalls, 1999). Gamache suggests that, "Presenters should ask questions, invite input, and look to the older audience frequently for responses" (Gamache, 1997, p.2-45).

The third concept is "readiness to learn". In child learning the teacher develops a sequence of learning tasks so that a curriculum begins with simple tasks progressing to more

difficult tasks. An example of sequence would be teaching arithmetic before trigonometry. In andragogy the adult participants diagnose their learning needs and the instructor acts as a resource to help them identify these needs. (Ingalls, 1999).

The fourth concept is "time perspective and orientation to learning". "We are used to thinking of education in terms of [preparation for the future] rather than [doing in the present]" (Ingalls, 1999, p. 8). Ingalls goes on to state that; "Andragogy is a process for problem finding and problem solving in the present; it is an orientation to the discovery of an improvable situation, a desired goal, a relation to the reality of the present situation" (Ingalls, 1999, p.9).

Ingalls explains this quote by saying that adults learn best when "… they have a need to know as a result of experience, a present problem situation or learning need" (Ingalls, 1999, p. 9). "The primary function of the teacher in an andragogical activity is that of managing or guiding the process itself, rather than managing the content" (Ingalls, 1999).

Barriers to Learning

Much is made of an older adults limitations but in her research for gerontological nursing Steffl states that elderly people are just as capable of learning as younger people, but studies have found that it may take longer. The relationship between learning and short term memory loss can be overcome by communicating slower, deliberate, and by using repeated reinforcement (Steffl, 1984).

The basic human needs of the elderly were addressed in Steffl's research when she states that some of the elderly are devoting all of their energy worrying how to provide for food, shelter, and clothing. This is a true barrier to any fire education program when you consider that 18.4% of the elder population is below or near the poverty level (AARP, 1997). Gamache states that although poverty is not usually a lifelong affliction for the population as a whole, the elderly

and the disabled are unlikely to have their financial status changed in their lifetime (Gamache, 1997, 2-46).

Physical barriers to older adult learning include the onset of ailments such as arthritis which "… is the most common chronic condition of the elderly" (Scharlach & Robinson, 1999, P.4). With age comes the reduction in nerve cells which eventually affects response time and coordination, because of the reduced efficiency of nerve transmission. Changes in the endocrine system can cause reduced stamina.

Sensory changes include a decrease in pupil size in the eyes, which require older students to need up to three times the amount of illumination to see as a younger person. Hearing problems may be a barrier as 30% of the elderly have some hearing impairment (Scharlach & Robinson, 1999, p. 16).

Cognitive barriers may or may not be a factor. Most older people have no cognitive impairment. Tests have demonstrated a reduction in fluid intelligence after age sixty, but there is no loss of "crystallized intelligence" or knowledge that a person has attained from life experience. Older adult learning can be improved with training and practice. "The process of learning new information and encoding it requires more time, because of the reduced efficiency of neural transmission and because of sensory deficits that limits ones ability to accurately perceive information…" (Scharlach & Robinson, 1999, p. 7). Lastly, physical illnesses and medications, as well as emotional conditions can also reduce energy needed for the cognitive process (Scharlach & Robinson, 1999).

With this information it was felt that identifying the most vulnerable of the older adult population was in order. Written correspondence in the form of a questionnaire (Appendix A)

was sent to Casey Culbert-Allman, Public Relations Director for the Boston Visiting Nurses Association (VNA). This questionnaire discovered the following information;

- The Boston VNA services 11,200 elderly patients, or 70% of their entire patient load,
- Of these patients 15% were considered mobile, 75% were considered semi-mobile, and 10% were immobile,
- For their patients the Boston VNA felt that improvements in fire safety technology would have a more profound affect than increased fire safety education,
- The Boston VNA did consider changing a smoke alarm battery an easy process for 70% of their elderly patients,
- Minor burns were not a common occurrence for their patients,
- Eighty percent of their elderly patients lived independently while 20% resided in assisted living locations, and
- Thirty percent of their elderly patients were living below the poverty level.

Previous Studies

This literature review also reviewed reports and surveys taken in the past concerning fire and safety instruction for the elderly population. One report titled *Senior Safety* completed in April 1997 compiled information received from older adults and service providers to older adults. Researchers of the report studied the "best" ways to deliver a fire and falls education program to the older adult population.

The older adults that participated in the *Senior Safety* research program reinforced issues that were addressed in the Ingalls' article on andragogy. "Older adults believe the Program (fire

and fall safety) should be interactive, and include hands-on demonstrations" (Interwest Applied Research, 1997, p.4). Older adults also state that the teaching program should be different depending on the different characteristics of the audience (Interwest Applied Research, 1997). This last statement proves the need of associating the learning process with the experiences of the adult group.

A survey was produced by the National Fire Protection Association's (NFPA) Center for High Risk Outreach, by the Custer Powell Inc. (1999). This survey was for the purpose of providing guidance for a program entitled, "Fall and Fire Prevention for Older Adults".

The survey asked three questions. The first question asked the participants their favorite song of all time. The second question asked with whom would you most like to have dinner with, including people that are now deceased. The last question asked the participants to check off five things you would like other people your age to know about preventing falls and fires in the home.

The survey involved 277 participants spread out in seven areas across the United States. Of the 277 participants eighty-six (86) were between sixty and seventy years old, one hundred and fifteen (115) were between seventy one (71) and eighty (80) years old, forty three (43) were between eighty one (81) and ninety (90) years old, and two participants were over ninety-one (91).

The five most popular songs were:

- Amazing Grace
- God Bless America
- Star Spangled Banner
- America The Beautiful

- How Great Thou Art

Favorite dinner companions included:

- Bill Clinton
- Oprah Winfrey
- Franklin Roosevelt
- Billy Graham
- Hillary Clinton

Bill Clinton was fifty (50) votes ahead of Oprah Winfrey. It was noted in this report that Dick Van Dyke the former spokesperson of the NFPA's "Learn Not To Burn" program received only one vote in this survey.

The five things they wanted people their age to know were led by fall protection. The NFPA survey concluded that:

> Viewed overall, fall prevention accounted for thirty-five percent (35%) of the identified safety issues: scatter rugs were a frequently mentioned topic in the area of fall prevention. Various fire safety behaviors accounted for the remaining issues. Cooking safety was the most frequently mentioned fire topic; concern about leaving a stove or an oven unattended was a frequent theme. Smoke detectors were identified very infrequently, perhaps reflecting a lack of knowledge about these important safety devices among the respondents (Powell, 1999, p.7).

This survey can be used in the establishment of a local fire safety program that includes the interests of the older adult population.

Technology

The literature review for technology concentrated on the issues that seem to affect the older adult population, namely;

- Careless smoking which is the highest cause of death amongst the older adult population; "People age 75 and over had the highest 1992-96 death rate for these types of fires, with 12.7 deaths per million persons" (Hall, 1998, November, p. ii).
- Cooking hazards, which cause the most fire injuries in the older adult population (Hall, 1998, January).
- Clothing, the older adult population has the most incidents of fires involving their clothing (Hall, 1998, January).
- Smoke alarms, the older adult population is more likely to have an inadequate number of smoke alarms, or possess non-functional alarms (Ahrens, 1998).

Smoking Materials

According to Hall's report titled *The U.S. Smoking Materials Fire Problem Through 1996;* **"**Out of 12 major causes of structure fires, smoking materials ranked first for civilian fire deaths, and third for civilian fire injuries" (Hall, 1998, p. 1). There was also a 10% increase in smoking related fires from 1995 to 1996. Abandonment or careless handling of smoking materials was the leading cause of fire in residential properties, followed by falling asleep while smoking. Older adults especially those over 75 years old are six times more likely to die in a smoking related fire than adults aged 20 to 29. This becomes even more astounding when figures also state that the percentage of people who smoke over age 65 is less than half the percentage for 18 to 64 year-olds (Hall, 1998).

Congressman Joseph Moakley (D-MA) introduced a Fire Safe Bill – The Cigarette Safety Act - in October of 1979 in response to a Memorial Day fire in Massachusetts, which killed a family of seven. The bill called for a creation of fire safety standards for cigarettes that would be less likely to ignite upholstered furniture and bedding.

Congressman Moakley's Cigarette Safety Act of 1984 created a Technical Study Group (TSG) to assess the technical feasibility of creating a fire-safe cigarette. The TSG found that it was possible to make a fire safe cigarette. The fire safe cigarette would have the following characteristics;

- Filter tip
- Less porous paper
- More expanded tobacco
- Smaller diameter
- No citrate added to the paper

On March 16,1999, Congressman Moakley reintroduced the Fire Safe Cigarette Act giving the Consumer Product Safety Commission the authority to develop safety standards in 18 months and giving cigarette companies a year to comply.

The report mentioned five brands on the market today that comply with the standard. They are;

- More White Light 120
- More 120
- Virginia Slims Superslims 100
- Capri Lights 100

- Eve Lights (Written correspondence from Representative Joseph Moakley's office, March 1999).

Cooking Hazards

In his NFPA report titled *U.S. Home Cooking Fire Patterns and Trends Through 1996* Hall states that cooking equipment fires are the leading cause of reported home fires. Home cooking fires totaled 99,500 in 1996, causing 4,800 injuries making cooking fires the leading cause of fire injuries in the home. Civilian deaths totaled 396 in 1996, which was the largest total since 1986 (Hall, 1998, March).

The home cooking fire problem is usually associated with one major device "the range" which combines an oven with a surface unit for stove top heating. These devices are usually gas powered or electrically powered. Electrically powered units have a higher rate of injuries; while the gas powered units have a higher rate of deaths. The majority of fires for both devices are stoves left unattended during operation (Hall, 1998, March).

The older adult population is particularly susceptible to cooking fires. In the NFPA report titled *Patterns of Fire Casualties in Home Fires by Age and Sex, 1991-95*, it states that 26.7% of fire injuries to the 65 and over population are cooking related, as is 20.1% of the fire deaths (Hall, 1998, January, p. 41 & 53).

Automatic fire extinguishing systems that can be installed above cooking areas have been developed for residential occupancies. These units can be mounted under an exhaust hood above the range top. These units are engineered to release either a wet or dry chemical to extinguish a range top fire. However, even with the use of this technology a hot surface is required to cook food, and as long as this fact remains, training and education will be needed to keep awareness levels high. Wearing tightly fitted clothing while cooking and keeping vigilant will always be

required (personal communication with Christian Dubay, Fire Protection Engineer, NFPA, April 13, 1999).

Home extinguishing systems for stovetops are available as noted above but there has been a resistance to this application by the building industry and a lack of concern by people in general. This system is underpromoted and not taken serious, just like home sprinklers (personal communication with Kevin Kort, Senior Engineer, Underwriters Laboratory, April 13, 1999).

Clothing

"Clothing fire deaths number approximately 200 annually" (National Commission of Fire Prevention and Control, 1989, P. VIIII). The majority of clothing fire accidents involve popular fabrics. Cotton and polyester are flammable materials and represent a large proportion of clothing fabric used by the garment industry. Nylon and acetate from which many undergarment products are made actually melt and liquefy which many times exacerbates the problem (Chines, 1997, P. 4-19). Older adults are predisposed to clothing fires as 6.9% of smoking related fire deaths involve the clothing worn by older adults over age 65 compared to 2.0% of victims under 65. The figures for cooking fire deaths involving clothing was 44.9% for people over 65, compared to 4.4% for victims under 65.

In 1953 the President of the United States passed the Federal Flammable Fabrics Act. This act required fabrics used for wearing apparel to be "not so highly flammable as to be dangerous when tested". The testing used at this time was deemed not appropriate by the NFPA and was rectified by NFPA standard 702. Additional requirements are mandated for children's sleepwear up to size 14, and stricter requirements have been imposed on sleepwear used by older adults in institutional settings (Chines, 1997).

Smoke Detectors

In a report titled *U.S. Experience with Smoke Alarms and Other Fire Alarms,* "households without smoke alarms are slightly more apt to be poor, non-white or headed by an adult over age 65" (Ahrens, 1998, p. I). This report also reviewed a program offered to an older adult population involving free installation of smoke alarms to a residential population of older adults age 75 and over. Four out of five participants lived in one-family homes. Volunteers were instructed to install as many alarms necessary to bring each home up to code and to check the condition of previously installed alarms. This program noted some interesting results. No alarms were found in 18% of the 139 homes visited and thirty-nine percent of existing alarms in these homes were not functional. Half of the non-functional alarms had dead batteries; and one-quarter had missing batteries. As new detectors were installed a dowel was left and instructions were given on how to test the batteries (Ahrens, 1998). The importance of smoke alarm technology has to be accentuated in older adult fire education; this fact was expressed earlier in the research conducted by the NFPA's Center for High Risk Outreach.

A written interview in the form of a questionnaire (Appendix B) was sent to Mr. Merten W. Bunker, Chief Electrical Engineer for the NFPA. This interview dealt with making smoke alarm maintenance more convenient for older adults. Considering the fact that many smoke alarms in use by older adults had dead batteries, it was suggested that they be offered alarms that had plugs that could be directly connected to a wall outlet. Another suggestion offered that the battery housing could be connected by a wire to a point on a wall that was within reach without the use of a stool or a ladder.

Mr. Bunker responded by fax and also by telephone. He did say that the technology suggested above was available; however, he felt that utilizing alarms with ten year batteries that could be tested with a flashlight were the best technological advances concerning this issue.

Existing Programs

Four existing programs were reviewed for this research project. *Let's Retire Fire* is a program sponsored by the FEMA and the U.S. Fire Administration. This program gives fire safety instructors a plan for identifying the older adult population in the community, presentation guidelines, brochures and handouts for students, and scripts for local media organizations to create public service announcements. This program addresses the key topics of careless smoking, cooking accidents, and the importance of smoke detectors.

Remembering When: A Fire and Fall Prevention Program for Older Adults is a program sponsored by the NFPA and the Center for Disease Control. This program in addition to fire safety also includes information on preventing falls. This program is very interactive with the older adult audience. It includes games of trivia, hands-on demonstrations, and a fall safety checklist that participants fill out regarding the danger of falling in their homes. This program has presentation plans for group settings and individual home visits for the less mobile participants.

Project Fire Wise is a program that was established in St. Paul, Minnesota. This program was a partnership between the St. Paul Fire Department, the American Red Cross, The Ramsey County Public Health Nurses, Firefighters Local 21, and the International Brotherhood of Electrical Workers #110. Older adults were surveyed in this project regarding the importance of smoke detectors and if they in fact had smoke detectors in their homes. This program made

presentations to retiree clubs, church groups, and received information from visiting nurses to reach the less mobile.

Over 5000 older adults participated in this program, which included the installation of smoke detectors by fire personnel and members of the electricians union.

A research project was undertaken by Chief Timothy K. Fuller of the St. Paul Fire Department on Project Fire Wise and he concluded that before the project 25% of the older adult population did not have working detectors. There were 1,250 smoke detectors distributed to this population of which 251 were installed. "The program resulted in a reduction of senior fire deaths in St. Paul from one in three to one in five" (Fuller, 1995, p.13).

Partners for Safety is a prevention, protection, and public education program aimed at reaching the elderly and the disabled. Program coordinator Pamela R. Landis created this program after researching safety programs in other parts of the world including Canada and Switzerland. It emphasizes forming preplans for people that are least likely to survive a disaster, especially fire. The key is to identify the most vulnerable of the community by gaining information from survey forms and questionnaires. This program used a simulated escape room to demonstrate how to safely escape a fire. Smoke detector education and installation was available, as well as other aspects of fire safety education. This program has been implemented in Philadelphia as well as other locations in Pennsylvania (Landis, 1991).

PROCEDURES

This research project employed descriptive research methodology to study the science of adult learning techniques, the technology of fire safety, the demographics of the older adult population within the City of Boston, and fire safety programs currently in use. This research

utilized a comprehensive review of literary sources, past research findings, and personal communication with experts in the field of fire safety.

Literature Review

The literature review began at the National Fire Academy's Learning Resource Center in March of 1999. Additional research was done at the University of Massachusetts Healy Library in Boston, Massachusetts, and the National Fire Protection Association Library in Quincy, Massachusetts.

The literary research involved researching medical texts regarding older adult physical and cognitive learning abilities. Technical research was also needed for the study of fire prevention regarding older adult activities that expose them to fire risk. Existing fire prevention programs were researched to study their applicability for the City of Boston.

Personal Correspondence

Oral correspondences were made between this author and fire safety technical engineers employed by the NFPA and Underwriters Laboratory. This interaction was made to gain advice on the possibility of applying technological improvements to devices that expose the older adult population to fire.

Christian Dubay, Senior Engineer for the NFPA was contacted regarding technology that could reduce the fire injury rate of older adult involved in cooking accidents. Kevin Kort, Senior Engineer for Underwriters Laboratory was consulted on technology that provides an automatic fire extinguishing system for cooking equipment used in the home. Merten Bunker, Chief Electrical Engineer from the NFPA was contacted regarding smoke detector technology.

Written correspondence was made to people concerned with older adult health care, adult learning, and fire safety education. Sharon Gamache the director for the NFPA's Center for High-Risk Outreach was consulted for her knowledge on providing fire safety education to vulnerable populations. Casey Culbert-Allman Public Relations Director of the Boston Visiting Nurses Association was contacted regarding older adult health care issues that could interfere with fire safety education. Finally, Congressman Joseph Moakley's office was consulted on the Bill he filed concerning Fire Safe Cigarettes.

Assumptions

It was assumed that all facts and figures received from the research of others was done according to proper standards and procedures.

Limitations

The limitations that influenced this project mainly concerned the lack of direct interaction with the older adult population. Concerns regarding privacy and the inability to reach all sectors of the adult population made this impossible to accomplish considering the time given for completion. To counteract this situation research done by other agencies, as well as communication with people involved in older adult interaction was utilized.

This research mainly pertains to older adults living in unassisted environments, although many of these findings can be used to enhance fire safety in nursing homes, and board and care facilities.

RESULTS

1. What are the demographics of the older adult population in Boston, Massachusetts and what are the future projections?

In 1990 there were 86,925 residents over age 60, or 15.1% of the entire population. 78.7% of which declared themselves as Caucasian, 14.3% declared themselves as Black, 3.6% were declared as Hispanic, 3.2% as Asian, and 0.18% were declared as "Other" (U.S. Census Bureau, 1993).

In 1995 a study was undertaken by the Boston Public Health Commission, which found that there were 65,152 residents over age 65 or 11.3% of the population. Of these residents 63.6% were female. People over 85 accounted for 1.4% of the population. This sector had the most health problems and accounted for 29.5% of hospital discharges during years 1994 through 1996.

People over age 65 in Boston living below the poverty level numbered 15.3% of their population in 1990, an increase from 12.9% in 1980 (U.S. Census Bureau, 1993).

Most older adults lived in West Roxbury, followed by Roslindale, South Boston, the Fenway, the North End, and the South End sections of Boston (Boston Public Health Commission, 1998).

Future projections in the older adult population for the City of Boston are approximately a 2.8% increase in people over age 65 around the year 2005. The 1990 census shows that the population of people age 50-59 numbered 40,809 while people age 80 and above numbered 16,856 (U.S. Census Bureau, 1993). Boston can expect approximately 20,000 more citizens above age 65 by 2005. Considering the increase in life expectancy, this number can be added to

the future population figures. In the year 2005 Boston could have 14.1% of its total population over the age of 65.

2. How is the older adult population affected by fire?

In a report written by John R. Hall for the NFPA titled *Patterns of Fire Casualties in Home Fires by Age and Sex, 1991-95* the following facts were produced. People age 65 and over had a fire death rate of 27.6 fire deaths per million, or roughly twice the average. People age 75 and over had a fire death rate of 37.9 fire deaths per million, or nearly three times the national average. People age 85 and over had a rate of 59.4 fire deaths per million or more than four times the national average.

Older adults had higher rates of death caused by burns and were found closer to the point of fire origin than any other sector of the population. Careless smoking was the highest cause of death by fire amongst the older adult population figuring at 12.7 deaths per million. Ignition of clothing is found to be more prevalent in the older adult population as opposed to other populations. Older adults that sustained injuries from fires were more apt to be physically or mentally challenged (Hall, 1998, January).

3. What are the issues that must be addressed when creating an educational program for the older adult population?

The issues that must be addressed include developing a fire safety program that adheres to the andragological philosophy of John Ingalls. The educational process must include the four elements of andragogy namely; self-concept, experience, readiness to learn, and time perspective and orientation to learning.

Barriers to learning must be identified and each program must be tailored to the specific needs of the audience. The research of Scharlach & Robinson has identified sensory deficiencies

such as vision and hearing loss as major concerns. Older adults also require more time to mentally process new information (Steffl, 1984). Physical illnesses and medications have been identified as possible barriers to learning for the older adult population (Scharlach & Robinson, 1999). These issues must be addressed when designing a fire education program.

Past research sponsored by the NFPA has proven that older adults want active participation with "hands-on demonstrations" (Interwest Applied Research, 1997).

4. What simple changes in fire safety technology would have a positive affect on the older adult population?

Careless smoking habits cause the most fire deaths in the older adult population (Hall, 1998, November). Congressman Moakley's Fire Safe Cigarette Act addresses this problem by creating a cigarette that is less apt to start fires when left unattended. Installing automatic extinguishing systems using wet or dry chemicals above stoves built into the exhaust hood can prevent cooking accidents. This product has been tested and is available (Kevin Kort Underwriters Laboratory, personal correspondence April 13, 1999). The ignition of clothing worn by older adults can be reduced by the application of fire retardant into fabric during production. At present only children's sleepwear is required to meet strict fire spread requirements (Chines, 1997). The production of smoke alarms with ten-year batteries that can be tested with the use of a flashlight is a product that could easily be used by the older adult population. This product requires no ladders for testing the alarm and the long-term power supply ensures proper operation (Merten Bunker personal correspondence May 19,1999).

5. What are the attributes of existing programs now being implemented by other fire safety educators?

All programs researched for this project addressed the major issues of careless smoking habits, cooking dangers, and the importance of smoke alarms. FEMA's program *Let's Retire Fire* was very informative regarding the issue of using community volunteers to help administer the program. This program also included information on creating Public Service Announcements.

The NFPA and the Center for Disease Control created a program that is very interactive with the audience and includes direction for preventing falls. This program is called *Remembering When: A Fire and Fall Prevention Program for Older Adults.*

Project Fire Wise was created in St. Paul Minnesota, by the St. Paul Fire Department and concentrates on providing smoke detectors to the older adult population. This was done by using a strong interagency approach that enabled them to reach a large segment of the population.

Partners for Safety provided fire safety education and developed a preplanning system. Instructors gathered information from participants to identify the most vulnerable citizens and made this information available to responding fire companies.

DISCUSSION

The AARP states that people age 65 and older numbered 33.9 million in 1996, and will number 70 million by the year 2030. Fire services across the country must plan now for the needs of this population. As life expectancy increases so does the number of people most affected by fire. Research proves that as we age we do have a degeneration of cognitive and physical abilities. These losses of ability are not consistent, but are within all of us to some

degree as we age. Hearing loss, vision loss, and arthritis are all common afflictions within the older adult population. These deficiencies make elders less apt to respond appropriately in dangerous situations. Preparing fire safety and prevention programs must take these facts into account.

Fire safety education for older adults should be coupled with improvements in technology. The fact that people are living longer and living independently will mean that people will be performing tasks at an older age that will require them to interact with fire and heat. Cooking, driving, smoking, operating dryers, furnaces, and water heaters will be done by people at much older ages then ever before. The needs of older adults requiring fire safety should be reflected in the technology of these products.

Reaching the older adult population is a difficult task for any metropolitan fire department. This population includes people who are mobile and many that are homebound. This research has shown that working with other community agencies will be necessary to provide a comprehensive fire safety program to the older adult population in Boston. In researching existing fire safety programs we have found that visiting health care agencies, church groups, retirement clubs, and neighborhood committees are sources of help and information. Interaction with these groups will be necessary for a successful program.

The benefits of providing a comprehensive fire safety program to the older adult population are many. Most important is the fact that the fire service will be providing for the safety of its most vulnerable citizens. Benefits will also be attained for the fire service; community relations can be strengthened, as well as political influence.

The results of this research show that it is in the best interest of the Boston Fire Department to increase its fire education program to include more services for the older adult

population. To pursue more programs of prevention and intervention is the current philosophy and this manner of thought should be embraced rather than stalled.

RECOMMENDATIONS

1. Fire chiefs in the City of Boston must work to change the organizational cultural so that members will be more acceptant of its fire prevention and education duties.
2. A certain percentage of the annual budget should be earmarked for older adult fire safety, and the amount should include the training costs that will be necessary to teach people how to properly teach older adults.
3. The Boston Fire Department should establish liaisons with other agencies that interact with older adults to include them in the administration of this program.
4. The Boston Fire Department should select interested members to serve on a committee that can examine existing older adult fire safety programs to produce an older adult fire safety program that meets the needs of Boston.
5. The Boston Fire Department should actively participate in the study and implementation of technological advances that would enhance the fire safety of older adults within their communities.

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APPENDIX A

To: Casey Culbert-Allman April 15, 1999
Boston Visiting Nurses Assoc.
Public Relations

Fm: Gerard T. Fontana
District Chief
Boston Fire Dept.

Re: Questionnaire, for Elderly Fire Protection

Thank you for agreeing to participate in this project. I realize that your schedule is very busy, and that time is not a bountiful commodity.

This information will be used for an applied research project I am participating in with the National Fire Academy.

Could you please have this information returned to me by May 10, 1999.

Thank you;

Gerard T. Fontana

1. How many clients of the Boston Visiting Nurses Assoc. would be classified as elderly?

   _____

2. Of these clients what percent would you consider,

   Mobile _____%

   Semi-mobile _____%

   Immobile _____%

3. What type of fire safety program would have the most profound effect on your elderly clients?

   Education _____

   Improvements in technology _____

Note: Improvements in technology would include fire resistant clothing, safety features on cooking appliances, improvements in home fire detection, and self-extinguishing smoking materials.

4. Do you consider replacing a battery in a smoke detector an easy process for most of your elderly clients?

   Yes ---- No ----

5. Are minor burns a common occurrence with your elderly clients?

   Yes ---- No ----

6. How many of your elderly clients ,

   Live independently -------

   Reside in assisted living ------

7. What percent of your elderly clients would you consider to be living below the poverty level?

   _____

APPENDIX B

To: Merten Bunker May. 1, 1999
National Fire Protection Association

Fm: Gerard T. Fontana
District Chief
Boston Fire Department

Re: Smoke detector use by older adults;

Dear Sir;

I am currently involved in an applied research project with the National Fire Academy in Emmitsburg, MD. This project is assessing fire safety issues as it affects the older adult population. I have already consulted with Sharon Gamache of the NFPA's Center for High Risk Outreach, Christian Dubay, an engineer for the NFPA, and Kevin Kort an engineer for Underwriters Laboratory.

I have prepared a questionnaire regarding smoke detectors, which I hope you find the time to participate in and share your knowledge.

My concerns with smoke detector technology include the following issues;

- The ability of an older adult (elderly) to change a detector battery, and
- The fact that they are required to be either on a ceiling or high on a wall for proper operation.

My research up to date has concluded that a large percentage of older adults have some degree of arthritis, is injured by falling, and are more apt to either have no smoke detectors or have detectors with dead batteries or missing batteries. This information was contained in reports conducted by the NFPA, American Association for Retired Persons
(AARP), and the Center for Disease Control (CDC).

Your knowledge and your opinions on this matter are greatly appreciated.

Thank you;

Gerard T. Fontana
District Chief

In my research regarding fire safety for the older adult population I would like your opinions on the following topics.

1. Is the technology available to design smoke detectors that would allow the battery holder to be placed outside of the housing of a smoke alarm? For example, could a wire extend from the alarm to a point low enough on a wall surface for one to replace the battery without the use of a ladder or stool?

2. Is the technology available for a smoke alarm to be operated by a wire that could extend from the device to a wall outlet?

3. What would be the negatives or positives concerning offering these types of smoke detectors to the older adult population?